



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,326	07/06/2006	Harue Nakashima	0756-7732	9757

31780 7590 01/14/2011  
Robinson Intellectual Property Law Office, P.C.  
3975 Fair Ridge Drive  
Suite 20 North  
Fairfax, VA 22033

EXAMINER
----------

BOHATY, ANDREW K

ART UNIT	PAPER NUMBER
----------	--------------

1786

MAIL DATE	DELIVERY MODE
-----------	---------------

01/14/2011

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/585,326	<b>Applicant(s)</b> NAKASHIMA ET AL.	
	<b>Examiner</b> Andrew K. Bohaty	<b>Art Unit</b> 1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 29-31,33,50-52 and 55-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 29-31,33,50-52 and 55-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2010/12/21</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 21, 2010 has been entered.

2. This Office action is in response to the amendment filed December 21, 2010, which amends claims 29-31, 51, and 52, cancels claims 10, 11, 32, 49, and 53, and adds claims 55-60. Claims 29-31, 33, 50-52, and 55-60 are pending.

### ***Response to Amendment***

3. The applicant's cancellation of the claims, filed December 21, 2010, has caused the withdrawal of the rejection of claim 49 under 35 U.S.C. 112, first paragraph, as set forth in the Office action mailed September 21, 2010.

4. The applicant's cancellation of the claims, filed December 21, 2010, has caused the withdrawal of the rejection of claims, 10, 11, 32, and 49 under 35 U.S.C. 112, second paragraph, as set forth in the Office action mailed September 21, 2010.

5. Applicant's amendment of claims and cancellation of the claims, filed December 21, 2010, has caused the withdrawal of the rejection of claims 10, 11, 29-33, and 49-53 under 35 U.S.C. 103(a) as being unpatentable Liu et al. (Synthetic Metals 2004, 146,

Art Unit: 1786

85-89) in view of Hosokawa (US 6,660,410) and Thomson et al. (US 6,242,115) as set forth in the Office action mailed September 21, 2010.

### ***Response to Arguments***

6. Applicant's arguments with respect to claims 29-31, 33, and 50-52 have been considered but are moot in view of the new ground(s) of rejection.

### ***Information Disclosure Statement***

7. The information disclosure statement filed December 21, 2010 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

8. There is no copy for cited foreign patent document JP 20-265773.

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1786

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 29-31, 33, 50-52, and 55-60 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Raychaudhuri et al. (US 2004/0222737) (hereafter "Raychaudhuri")

in view of Liu et al. (Synthetic Metals 2004, 146, 85-89) (hereafter "Liu"), Hosokawa (US

6,660,410) (hereafter "Hosokawa"), and Thomas et al. (Journal of the American

Chemical Society, year 2001, volume 123, pages 9404-9411) (hereafter "Thomas").

12. Regarding claims 29-31, 50-52, and 55-60, Raychaudhuri teaches a light emitting

device comprising a light emitting element comprising an anode, a hole injecting layer

over and in contact with the anode, a hole transporting layer over the hole injecting

layer, a light emitting layer over and in contact with the hole transporting layer, and a

cathode of the light emitting layer (Fig. 1 paragraph [0028]). Raychaudhuri teaches the

hole injecting layer can be composed of MoO<sub>x</sub> (paragraph [0031]). Raychaudhuri

teaches the hole transporting layer can be composed of any type of hole transporting

material known in the art, including amine containing compounds (paragraph [0033]).

Raychaudhuri teaches the light emitting layer can be composed of a host material and a

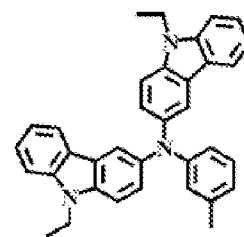
dopant (paragraph [0080]). Raychaudhuri teaches the host material can be a variety of

different materials, including anthracene compounds (paragraphs [0080]-[0106]).

Art Unit: 1786

Raychaudhuri teaches the dopant can be a phosphorescent dopant (paragraph [0113], compounds L45 and L48).

13. Raychaudhuri does not specifically teach where either the hole transporting layer or the light emitting layer is composed of a carbazole compound the meets applicant's formula (1).



14. Liu teaches a carbazole compound with the following structure, (DECMA, page 86 right column), which reads on applicant's formula (1), where  $R^{12}$  and  $R^{14}$  are hydrogen and  $Ar^{11}$  is m-tolyl. Liu teaches that these carbazoles can be used in light emitting elements and can be found in either the hole injecting-transporting layer, which is in contact with the anode and is between the anode and the light emitting layer, or in the light emitting layer and emits blue light (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA and page 88 Fig. 4 (A), left column all paragraphs under heading 3.3 EL performances of DECMA-based OLEDs).

15. Hosokawa teaches carbazole derivatives that can be used for light emitting devices wherein the N position of the carbazole contains an aryl group and teaches phenyl, naphthyl, anthranyl, phenanthryl, pyrenyl, biphenyl, and triphenyl as some of the preferred aryl groups (column 2 lines 56-67, column 3 lines 1-29, and column 7 lines 39-45, compounds (7)-(24)). Hosokawa teaches that changing the substituent attached to the carbazole group changes the glass transition of the material and that the glass

Art Unit: 1786

transition should be between 110 °C and 170 °C (column 6 lines 33-51). Hosokawa teaches that materials having a glass transition higher than 110 °C have a practical life span and a superior heat-resistance (column 29 lines 46-54). Hosokawa further teaches the carbazole compounds can be used as host materials for phosphorescent dopants in light emitting device (column 1 lines 14-67 and column 2 lines 1-33).

Hosokawa teaches the by using the carbazole compounds has host material the luminescence efficiency of the light emitting device can be increased (column 2 lines 10-20).

16. Thomas teaches a light emitting element comprising a carbazole compound (abstract). Thomas teaches the carbazole compounds can be used in either the hole transporting layer or the light emitting layer and contains both light emitting properties and hole transporting properties (page 9404 right compound paragraph at beginning of column). Thomas further teaches that when the N position on a carbazole group is changed from an alkyl group to an aryl group, when can change the HOMO and LUMO values of the compounds (page 9407 Table 1 compounds 9 and 10 and 11 and 12).

Thomas teaches that one can increase the HOMO value by making the group attached to the N position on the carbazole an aryl group (page 9407 Table 1).

17. Given the teaching of Liu, Hosokawa, and Thomas it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole derivative of Liu so the N positions of the carbazoles contained an aryl group having 6 to 25 carbon atoms, such as phenyl, naphthyl, anthranyl, phenanthryl, pyrenyl, biphenyl, or triphenyl, and where each aryl group attached to each carbazole group was

Art Unit: 1786

different, and use the carbazole compounds as a host material for a phosphorescent as in the light emitting layer of the light emitting device. The motivation would have been to increase the glass transition temperature of the material and therefore increasing the stability of the material. Furthermore, changing the group from an alkyl group to an aryl group would increase the HOMO value of the compound and changing the transporting properties of the material.

18. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute either the hole transporting material or the host material of the light emitting material of Raychaudhuri with the modified carbazole of Liu in view of Hosokawa and Thomas. Raychaudhuri teaches that the materials used for either the hole transporting layer or the host material for the light emitting layer can be a variety of compounds and does not limit the type of material that can be and Liu and Thomas specifically teach that carbazoles can be used as hole transporting materials and Hosokawa specifically teaches carbazoles can be used as host materials in the light emitting layer for phosphorescent dopants. The substitutions would have been one known hole transporting material for another known hole transporting material or one known host material for a phosphorescent dopant for another host material for a phosphorescent dopant and would lead to the predictable results of using carbazole compounds as either hole transporting materials or host materials for phosphorescent compounds in light emitting elements.



Art Unit: 1786

19. Regarding claim 33, Raychaudhuri teaches the light emitting elements can be used in display devices and the display device inherently emits lights, which makes it a light system (paragraph [0027]).

### ***Conclusion***

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

21. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

22. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/585,326

Page 9

Art Unit: 1786

/A. K. B./

Andrew K. Bohaty

Patent Examiner, Art Unit 1786

/D. Lawrence Tarazano/

Supervisory Patent Examiner, Art Unit 1786